MARKET FOR MS

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Y-TES
MS
CUSTOM
AUTHOR
Market for MS
TITLE

OFFICES

UNITED STATES

2180 Sand Hill Road
Menlo Park, CA 9402[illegible]
(415) 854-3422

15 Bond Street
Great Neck, NY 1102[illegible]
(516) 482-4170

EUROPE

67A High Street
Sutton
Surrey SM1 1DT
England

JAPAN

Overseas Data Service Company, Ltd.
Shugetsu Building, No. 12-7 Kita Aoyama
3-Chome Minato-Ku
Tokyo, 107
Japan
(03) 400-7090

030014

EVALUATION OF THE MARKET FOR MS SERIES SYSTEMS

PREPARED FOR:

TESDATA SYSTEMS CORPORATION

SEPTEMBER 1977

INPUT
2180 SAND HILL ROAD
SUITE 320
MENLO PARK, CA 94025

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EVALUATION OF THE MARKET FOR

MS SERIES SYSTEMS

TABLE OF CONTENTS

		Page
I	INTRODUCTION	1
II	DEFINITIONS	3
III	METHODOLOGY	4
IV	EXECUTIVE SUMMARY	5
	A. GROWING MARKET FOR HARDWARE MONITORS	5
	B. COMPETITION	7
	C. DEVELOPMENTS AFFECTING MARKET	7
	D. USERS ARE HAPPY WITH THEIR SYSTEMS	8
	E. MANAGEMENT IS THE MOTIVATOR	8
	F. USERS LIKE THE MS SYSTEM	9
	G. STRATEGIC RECOMMENDATIONS	9
V	ANALYSIS OF USER RESPONSES	
	A. BUDGETING FOR PERFORMANCE MEASUREMENT	13
	B. IMPACT ON HARDWARE AND SOFTWARE	14
	C. DEVELOPMENTS AFFECTING MARKET	14
	D. USER RECEPTIVITY AND PLANS	17
	E. JUSTIFICATION EVALUATION AND SELECTION	22
	F. KEY REASONS FOR BUYING	23
	G. RESPONDENTS' REACTIONS TO MS SERIES	24
VI	MARKET ANALYSIS AND FORECAST	26
	A. MARKET BY SIZE OF INSTALLATION	26
	B. MARKET SEGMENTATION	28
	C. COMPUTER HARDWARE PERFORMANCE MEASUREMENT SYSTEM (CHPMS) SHIPMENTS	30
	D. COMPUTER SOFTWARE PERFORMANCE MEASUREMENT SYSTEM (SCPMS) MARKET	37
	E. COMPUTER PERFORMANCE MEASUREMENT SYSTEM SERVICE (CPMSS)	39

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		Page
VII	TECHNICAL REQUIREMENTS FOR VENDORS	40
	A. SPECIALIZED KNOWLEDGE REQUIRED	40
	B. PLANNING FOR FUTURE SYSTEMS	41
VIII	MARKETING AND SALES REQUIREMENTS	43
	A. ACTIVE MARKET DEVELOPMENT PROGRAM	43
	B. MANAGEMENT ORIENTATION	44
	C. THE SALES PERSON IS ALSO A CONSULTANT	45
	D. USING PROSPECTS' "HIDDEN" MOTIVATIONS	46
IX	COMPETITIVE ENVIRONMENT.	50
	A. COMTEN HARDWARE	50
	B. COMTEN DATA COMMUNICATION PRODUCTS	51
	C. COMTEN'S PERFORMANCE MONITORING HARDWARE	52
	D. COMTEN'S PERFORMANCE MEASUREMENT SOFTWARE	56
	APPENDIX A	
	APPENDIX B	

LIST OF EXHIBITS

		Page
I-1	INTERVIEW PROGRAM	2
IV-1	PROJECTED CHPMS SHIPMENTS BETWEEN 1976 AND 1980	6
V-1	USER RECEPTIVITY AND PLANS	18
-2	KEY REASONS FOR BUYING MONITORING SYSTEMS	24
VI-1	FORECAST OF MARKET SIZE AND GROWTH OF WORLD-WIDE AND U.S. LARGE* IBM MAINFRAMES	27
-2	PROJECTED DOMESTIC CHPMS SHIPMENTS BY TYPE OF INSTALLATION 1976-1980	29
-3	U.S. MARKET FOR HARDWARE PERFORMANCE MEASUREMENT TOOLS	31
-4	1976 CHPMS MARKET SHARE	32
-5	PROJECTED CHPMS SHIPMENTS IN UNITS AND DOLLARS 1976-1980	33
-6	PROJECTED U.S. CHPMS SHIPMENTS IN DOLLARS 1976-1980 . .	34
-7	PROJECTED U.S. CHPMS SHIPMENTS IN UNITS 1976-1980 . . .	36
VIII-1	CUSTOMER MOTIVATION CHART	48

I. INTRODUCTION

I INTRODUCTION

- This report is produced by INPUT for the exclusive use of Tesdata Systems Corporation.

- Research for this report was conducted in three phases:

  - Phase I: Development and review of the user questionnaire after initial pre-testing
  - Phase II: Presentation of initial results and fine tuning of the questionnaire
  - Phase III: Final report and presentation

- Research carried out for this report included 5 in-person interviews and 41 telephone interviews as shown in Exhibit I-1.

EXHIBIT I-1

INTERVIEW PROGRAM

	TEL.	IN-PERSON	IBM	NON IBM	HARD-WARE	SOFT-WARE	BOTH	TESDATA MS
INTERVIEWS DURING PHASE I	0	1	1	0	1	1	1	1*
INTERVIEWS DURING PHASE II	24	0	20	4	12	16	12	9
INTERVIEWS DURING PHASE III	17	4	20	1	12	22	17	7
TOTAL	41	5	41	5	25	39	24	16**

• Research included interviews with COMTEN and Boole and Babbage

* Sumbox not counted as part of the total

** Four of the interviewed installations had multiple PM systems

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II. DEFINITIONS

II DEFINITIONS

- Computer Hardware Performance Measurement System (CHPMS). A computer performance measurement system based on external hardware. The external hardware usually consists of a data collection unit connected to probes attached to the host processor, a processing unit that analyzes the result and peripheral units which display, print or store the results for future trend analysis.

- Computer Software Performance Measurement System (CSPMS). A computer performance measurement system utilizing software to measure specific performance factors such as operating system efficiency and application software efficiency.

- Computer Performance Measurement System Service (CPMSS). A service designed to measure the efficiency of computer hardware and software and recommend ways to improve system performance.

III. METHODOLOGY

III METHODOLOGY

- INPUT interviewed 46 installations during the course of the research.

  - Eleven of the 46 users interviewed which were provided by Tesdata were CHPMS users.
  - Of the remaining 35 respondents

    (80%) used software monitoring

    (40%) used hardware monitoring

    (17%) used no monitoring

    (40%) used hardware and software monitors

    . All but one of the respondents who used hardware monitors also used one or more software monitors

  - Five our of 46 installations had non-IBM equipment

    . Two of the five with non-IBM equipment used no performance measurement tools

  - The six non-users of performance measurement tools were segmented as follows

    . Three single mainframe installations

    . Two non-IBM installations

    . One IBM multi-mainframe installation

IV. EXECUTIVE SUMMARY

IV EXECUTIVE SUMMARY

A A GROWING MARKET FOR HARDWARE MONITORS

- INPUT forecasts the U.S. market for computer hardware performance measurement systems (CHPMS) expanding from $13 million in 1976 to $38 million in 1980, a growth of 192% (see Exhibit IV-1).

  - The overseas CHPMS market will grow even more rapidly.

- This projection is based on current products continuing to be sold to the presently targeted markets.

  - The growth rate could be accelerated by a more aggressive marketing program described in the recommendation section of this report, and/or a downward expansion of the product line.

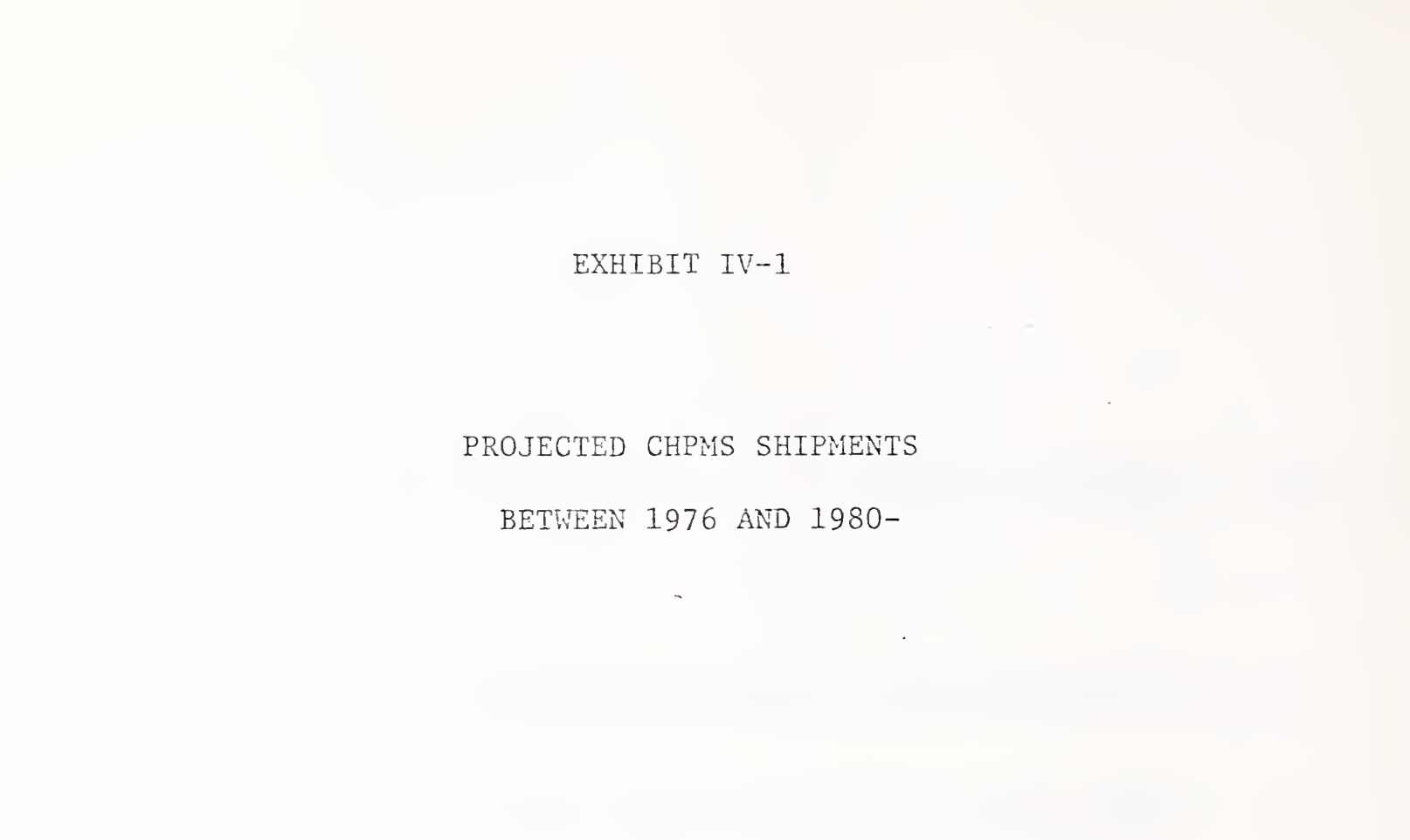
- Currently, the large multi-mainframe installations represent the highest potential market for computer hardware performance measurement systems (CHPMS).

  - 46% of the multi-mainframe installations interviewed have a hardware monitor.

EXHIBIT IV-1

PROJECTED CHPMS SHIPMENTS

BETWEEN 1976 AND 1980-



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- By 1980 70% of the multi-mainframe installations will have a CHPMS.

- The single mainframe installations represent a much smaller market for CHPMS.

  - The use of CHPMS among single mainframe installations will grow from 15% to 25% between 1976 and 1980.

B. COMPETITION

- IBM is neither currently nor forecasted to be a supplier of computer hardware performance monitoring systems. IBM is and will continue to be a supplier of computer hardware performance monitoring software.

  - COMTEN is the only significant hardware competitor

  - Boole and Babbage is the major software supplier in an otherwise fragmented market

C. DEVELOPMENTS AFFECTING CHPMS MARKET

- The most significant positive force in the market is the stretch-out in deliveries of 3033 mainframes by IBM requiring users to squeeze the last bit of performance from their currently installed systems.

- 64% of the interviewed users do not see data base management systems affecting the need for CHPMS.

- 76% of the interviewed users indicated an increased requirement

for CHPMS resulting from an increased utilization of data communications.

D. USERS ARE HAPPY WITH THEIR SYSTEMS

- Most users are satisfied with their performance measurement systems.
  - Software users have a higher satisfaction level than hardware users.
  - Of the 40 users of performance measurement systems, two were unhappy with the hardware and only one was unhappy with the software.
- 63% of the interviewed software users having no hardware monitors indicated that they had a 10% to 90% probability of obtaining a hardware performance monitor and 37% indicated a 0% probability.

E. MANAGEMENT IS THE MOTIVATOR

- The Director of Data Processing is usually the key decision maker in selecting and obtaining CHPMS.
  - The most frequent reason mentioned is to delay acquiring additional hardware.
  - Hardware is considered accurate, flexible, and real time oriented.
  - Software is less expensive and solves specific problems.

F. USERS LIKE THE MS SYSTEM

- All but one of the interviewed users were satisified with the MS series. They were pleased with:
  - Information gathered
  - Ability to postpone expenditures
  - Control over operation.
- Users reported that they would like to have more interpreting capability.

G. STRATEGIC RECOMMENDATIONS

- Recognize that small and medium sized users (users with single large CPUs) are generally not trained in performance measurement, nor are they aware of its potential benefits.
- Consider developing the following programs to promote performance measurement systems:
  - Conferences, seminars and other promotional programs in conjunction with nationally recognized groups and conferences such as AFIPS and NCC or conferences sponsored by IEEE, the AMA, DPMA, etc.
  - Invite satisfied users to present papers on their successful experiences.

- Consider developing a performance measurement service to measure and analyze computer hardware utilization.

  - The objective should be to provide the user with information to help him to:

    . Defer purchase of new equipment.

    . Avert bottlenecks.

- Provide a low cost data collection product to compete in the entry level market with Comten's low cost equipment.

  - The data collection equipment should provide inputs to be processed by a remote service company and analyzed by Tesdata personnel.

  - The hardware should be modular and upgradable to insure that the user will be able to build up his own system as his needs and knowledge increase.

- The service/hardware approach allows the user to get quick results at a reasonable price without having to dedicate a full time person to the PM task. In addition, the user can buy only those analysis services he needs each month (after a minimum fee is paid).

- The user can also build his own system gradually and have trained people who have gone through a "hand-holding" process and are familiar with the full potential of the PM system.

- The service/hardware approach allows Tesdata to compete in the low cost equipment market without impacting its existing product line.

  - Users can be trained to use the Tesdata systems by providing reports in a format identical to the output format of the MS Series.

  - Tesdata analysts, by interfacing closely with user personnel, become more sensitive to user requirements.

- In addition to an entry level approach, Tesdata should explore ancillary development areas such as data security monitoring, data communications monitoring and disk monitoring.

- Some of these functions require only additional software; others require small additions in hardware.

- Following are some of the functions which Tesdata R&D should explore developing.

(1) Monitor Data Communications

  . Track Transactions

  . Measure Traffic Peaks

  . Determine Number of Terminals On-Line

  . Check Front End Processor

  . Check Busy Lines

(2) Provide a Secure Environment With a Product Capable of:

- Tracking Transactions
- Providing Encription Algorithm
- Checking Access Authority
- Keeping Track of Access to Sensitive Information by Terminal and by Individual

(3) Monitor Disks to:

- Optimize Space Use
- Organize Data and Manage Placement
- Reduce Seek Time
- Reduce Arm Movement
- Optimize Buffer Size

All the above functions would be additive to Tesdata's present product line and would not cause any self-impact on the MS product line.

V. ANALYSIS OF USER RESPONSES

V ANALYSIS OF USER RESPONSES

A. BUDGETING FOR PERFORMANCE MEASUREMENT

- Performance measurement, except in very large installations, are not separate budgetary items, and most users are uncertain of the amounts spent for performance monitoring (PM).

  - When a complete accounting of the expenditures for PM was available, the budget for users of hardware PM ranged between 0.5% and 2% (the lower amounts were among users with the largest budgets even though the absolute amounts spent were large.)

  - Among users of software monitors, the amount spent on PM ranged from .1% and .3% of the total

- Large users indicated they were willing to spend up to $100K for HPMs.

- All the interviewed users, except Bank of America (which is buying four hardware performance monitors in 1977), are planning to more than double their PM expenditures by 1980.

- Most of the budget will be spent on additional salaries.

B. IMPACT ON HARDWARE AND SOFTWARE

- IBM does not market performance measurement hardware and knowledgeable users don't believe that IBM is interested in competing in this market.

  - There is a strong trend toward hardware monitoring systems. (72% of purchases in 75-77 time frame).

  - Comten is the only significant hardware competitor to Tesdata.

  - Sixty-five percent of the respondents indicated that there is a strong need for results oriented, decision focused hardware with more collectors and better interpretation capabilities.

  - There is an increasing awareness among respondents that people must be dedicated full-time to performance measurements, although most users are still not educated to the potential benefits of performance measurement.

C. DEVELOPMENTS AFFECTING THE MARKET

- The most important short term development affecting the market for performance measurement systems is the stretchout in the deliveries of the IBM 3033. Since the key reasons for buying PM systems are to

maximize system efficiency (33%) and improve resource management (30%), the delay in 3033 deliveries will impose an increased requirement for tools to improve the efficiency.

- Hardware performance monitoring systems will have the advantage of not requiring the use of the CPU to produce reports.

- Most respondent users (64%) presently believe that data base management systems will have no effect on performance measurement. A typical comment being: "Data base systems are generally inefficient."

- A few knowledgeable users are beginning to feel uneasy about not having control over their hardware.

  . "Would like to measure data access rates and have peak load comparison."

  . "Disk pack density and arm movement leveles for data access comparison."

  . "Reduce 'data seek' times and arm movement."

  . "Continuous on-line measurement to spot slowdowns."

- Seventy-five percent of the respondents indicated an increased requirement for performance measurement as a result of an increase in the use of data communications. Typical comments were:

- "Need ability to control as well as measure."

- "Must be able to control data traffic at timed intervals."

- "Must have probes at front end processors."

- "Would like to know how busy satellite processors are."

- "The more terminals on-line, the harder it is to track transaction rates."

- "Objective is to have the right number of lines; to always have a line available for a user but minimize cost by reducing the payments to common carrier."

- Comparing hardware and software monitoring systems users contributed the following comments:

  - Measurements which can be made with software PM that hardware PM cannot accomplish:

    . Application software tuning

    . Trace data movement through measurement of operating system

    . Memory mapping and memory residency capabilities

    . Segregating and tracking multi-programming job time quotients.

  - Measurements which can be made with hardware PM that software cannot accomplish:

    . Accuracy of CPU utilization

    . Real time data measurment

    . Measure multiple systems running in conjunction and condense data into one job stream and operating standpoint.

- The trend indicates that knowledgeable users will continue to use both hardware and software (with an increase in proportion of hardware users to match the use of software).

D. USER RECEPTIVITY AND PLANS

- Ninety-five percent of the respondents report satisfaction with their hardware performance measurement equipment. There is one user of Tesdata equipment and one of Comten equipment who are not happy. Both are discussed in another Section of this report.

  - A large majority of users are satisfied.

  - A large majority of users would buy again.

  - Most users have the equivalent of 1 to 3 people involved in performance measurement.

  - Most users are increasing the personnel committment to PM.

  - User comments reflected satisfaction:

    . "Saving $80,000 per month"

    . "Averting bottlenecks"

    . "Saving $2 million per year"

EXHIBIT V-1

USER RECEPTIVITY AND PLANS

PROBABILITY OF HARDWARE PERFORMANCE MEASUREMENT

PURCHASE IN NEXT 3 YEARS

AS REPORTED BY NON-USER RESPONDENTS

PROBABILITY PERCENTAGE	NUMBER OF RESPONDENTS	% OF TOTAL
76-100%	3	19%
31-75%	4	25%
10-30%	3	19%
0%	6	37%
TOTAL	16	100%

- Hardware users will expand personnel commitment.
- Some users prefer to plan hardware upgrades instead of buying a monitor.
- Some are upgrades of earlier measurement purchase.
- The problems most frequently cited by the users interviewed are:
  - Too much raw data
  - Data interpretation is difficult
  - No personnel to interpret results
  - Summaries of data difficult to get

- Training on system is inadequate
- Data reduction software is lacking
- Each new user goes through difficult 9-12 month learning curve

- Non-users responses are:
  - Non-users see need for monitors only in multiple mainframe environments
  - Non-users view monitors as an unnecessary cost
  - Some non-users see value in taking job-accounting work load off host

- Non-users objections to hardware monitors:
  - Only valuable in multiple CPU environment
  - No cost justification
  - Cannot actually defer equipment purchases if system is overloaded
  - Expensive toy
  - Vendors unstable
  - High cost for unclear results

- There is no pattern indicating which P.M. reports are most useful. Most users tend to produce reports which provide basic overview of

what the hardware is doing first and system efficiency overview reports second. Following are examples of reports cited by respondents:

- CPU utilization compared hourly
- General bottleneck check points
- Channel activity reports
- Systems profile
- 1-0 output reports
- Summary report of channel activity, disk access, paging
- Device utilization
- Availability of tape drives
- # of jobs run by type
- Personnel efficiency
- Scheduling trends
- Re-run analysis

Respondents were generally not concerned that the host computer is used to produce performance reports and did not consider this to be a major issue.

- Most respondents use hardware P.M. to fine tune their computer hardware and the performance of the data center.
  - System software and application software is fine tuned by P.M. software.
- The highest level of management to see the P.M. reports is generally the D.P. manager; although summary reports are frequently prepared for the V.P. of Finance or Administration.
- Tesdata is considered the leader in P.M. measurement and does not need any price advantages; 40% of the respondents owning Tesdata equipment indicated that they would not buy IBM P.M. equipment under any circumstances.
- Respondents who didn't buy hardware P.M. did it for two reasons:
  - See no value in it
  - Have no personnel to devote to P.M.
- The non-users would buy if confronted by a bottleneck or if there was a major price break.
- The primary decision criteria for obtaining a hardware P.M. system among non-users are:
  - Ability to increase efficiency of hardware and software
  - Ability to meet schedules

E. JUSTIFICATION EVALUATION AND SELECTION

- The most frequently reported reason for obtaining a performance measurement system is for installation control.
  - "To delay getting more hardware"
  - "To justify additional hardware"
  - Also mentioned:
    - . Forecast future hardware needs
    - . Meet time-sharing response specifications
    - . Determine system efficiency
    - . Maximize efficiency
- Hardware is most often selected because of its flexibility, accuracy and ability to provide real time measurements.
- Software is most often selected because it is: cheaper; solves a specific problem; analyzes data from inside the operating system; IBM provides it.
- The Director of D.P. is the individual responsible for procuring a P.M. system in 60% of the cases. The system manager in 15%, a V.P. or operations director in 12% of the cases. In each instance, the higher level manager was a former D.P. Director.

- The purchasing process follows a chain of approval usually starting with the user who is technically oriented, and ultimately to the D.P. Manager, Operations/Administration V.P., or even to the President in a small company.

F. KEY REASONS FOR BUYING

- Over 70% of the interviewees indicate that "maximizing system efficiency", "better resource management" or "justifying hardware expenditures" is the key reason for buying a performance monitoring system. (See Exhibit V-II)

  - Users identified some of the following justifications for performance measurement:

    . "Increased awareness of performance monitoring came from a conference on system efficiency"

    . "Cannot rely on vendors for efficiency advice because they have a hidden agenda of another hardware upgrade"

    . "Cannot afford to internally write performance measurement software"

    . "Desire to dissect internal functioning of operating system"

    . "Necessary for troubleshooting and fine-tuning application software"

    . "Resource management can defer new hardware expenses"

EXHIBIT V-2

KEY REASONS FOR BUYING MONITORING SYSTEMS

RATIONALE	NUMBER OF RESPONDENTS	% OF TOTAL
MAXIMIZE SYSTEM EFFICIENCY	14	33%
FINANCIAL - RESOURCE MANAGEMENT	12	30%
JUSTIFY HARDWARE EXPENDITURE	4	9%
TROUBLESHOOTING SYSTEM	8	21%
BECAUSE IT WAS FREE	2	6%
TOTAL	40	100%

G. RESPONDENTS' REACTIONS TO THE MS SERIES

- Positive:

  - "Happy with hardware and information gathered. Haven't used full capacity."

  - "I get information without tying up I/O and printers."

  - "Tesdata is unique - good reputation."

  - "Able to defer equipment expenditures."

- Negative:

  - "System too subjective - too much room for interpretation."

- Missing Features:

  - "Need more collectors."

  - "Need more probes."

  - "Make conclusions and recommendations integral to software."

  - "Need education to evaluate significance of data."

  - "Need condensed historical performance data."

- User suggestions for performance monitor feature improvements.

  - Operator response time log on system commands

  - More disk capacity

  - Editing capability

  - Better education on use of software

  - Software for historical comparisons

  - Fewer more condensed reports

VI. MARKET ANALYSIS AND FORECAST

VI MARKET ANALYSIS AND FORECAST

A. MARKET BY SIZE OF INSTALLATION

- The primary market for hardware performance management systems is with large multi-mainframe IBM installations (370/155 and larger).

- INPUT forecasts as shown in Exhibit VI-1 that the large mainframe market (USA) will grow 79% between 1976 and 1980. The overseas market will grow twice as rapidly as the domestic market.

- Driving forces in both domestic and international markets will be:

  - The higher economies of scale which are possible with large mainframes.
  - Consolidation of multiple medium sized mainframes into one or more interconnected large data centers.
  - Implementation of distributed processing favoring configurations consisting of two or more large mainframes surrounded by communications processors and terminals.

EXHIBIT VI-1

FORECAST OF MARKET SIZE AND GROWTH
OF WORLD-WIDE AND U.S. LARGE*
IBM MAINFRAMES

MARKET SEGMENT	1976	1980	4-YEAR GROWTH RATE
U.S.A.	2,700	4,200	56%
INTERNATIONAL	1,500	3,300	120%
WORLD-WIDE MARKET FOR IBM 370/155 AND ABOVE	4,200	7,500	79%

* 360/65 and larger

370/155 and larger

- The 2700 large IBM mainframes (USA) are segmented into single and multiple mainframe installations as shown in Exhibit VI-2. There were an average of 2.7 large mainframes per multiple mainframe installation in 1976. The number of mainframes per multi-mainframe installation will decrease slightly between 1976 and 1980 because:

  - More powerful CPU's (3033(s)) will be installed replacing more than one mainframe.
  - The new multi-mainframe installations will initially tend to have only two large mainframes.

- Hardware performance monitoring systems will increase their market penetration from 46% to 70% in multi-mainframe installations between 1976 and 1980, and from 15% to 25% in single mainframe installations during the forecast time period. See Exhibit VI-2.

- The penetration in the multi-mainframe market will continue to be higher than in the single mainframe market, spurred by the slow delivery of 3033 mainframes. This will create a capacity crunch which will force installations to become increasingly performance conscious and will promote the use of hardware monitoring equipment.

B. MARKET SEGMENTATION

- The market for performance measurement is divided into three segments:

EXHIBIT VI-2

PROJECTED DOMESTIC CHPMS SHIPMENTS BY TYPE OF INSTALLATION
1976 - 1980

TYPE OF INSTALLATION	1976			1980			GROWTH RATE	
	NO. OF INSTALLATIONS	PERCENT PENETRATION	NO. OF CHPMS	NO. OF INSTALLATIONS	PERCENT PENETRATION	NO. OF CHPMS	INST.	CHPMS
SINGLE MAINFRAME	900	15%	145	1,200	25%	300	33.3	107.0
MULTIPLE MAINFRAME	660*	46%	303	1,120**	70%	784	70.0	158.7
TOTAL MAINFRAMES	2,700	16.6% ***	448	4,200	25.8%****	1,084	56.0	142.0
TOTAL INSTALLATIONS	1,560	28.7%	448	2,320	46.7%	1,084	48.7	142.0

* Average No. of mainframes per installation = 2.7
** Average No. of mainframes per installation = 2.6
*** In 1976 there is one CHPMS for every 6 large IBM mainframes
**** In 1980 there will be one CHPMS for every 3.8 large IBM mainframes

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- Hardware (CHPMS)
- Software (CSPMS)
- Services (CPMSS)

- The (CSPMS) market had an earlier development, and there are 25 to 30 vendor companies participating. Each company has a narrow and specialized product line with the exception of Boole and Babbage - the leader in the software performance measurement field.

C. COMPUTER HARDWARE PERFORMANCE MEASUREMENT SYSTEM SHIPMENTS

- The U.S. market for computer hardware performance measurement tools will grow from $26 million in 1976 to $68 million in 1980, a composite growth of 161%. A more detailed analysis is shown in Exhibit VI-3.

- The 1976 shipments of hardware performance measurement systems (CHPMS) were $13 million. Tesdata accounted for 74%, COMTEN for 19% and others for 7% of total shipments. See Exhibits VI-4 and VI-6.

- INPUT forecasts that the U.S. hardware shipments in 1980 will be $38.1 million. International shipments could add another $40 million to the total.

  - Projections were calculated by extrapolating the results of the survey and forecasting the number of large IBM

EXHIBIT VI-3

U.S. MARKET FOR HARDWARE PERFORMANCE

MEASUREMENT TOOLS

($ millions)

DELIVERY MODE	YEARS 1976	1980	4-YEAR GROWTH RATE
HARDWARE	14	38	171%
SOFTWARE	12	25	108%
SERVICES	0	5	-
TOTAL	26	68	161%

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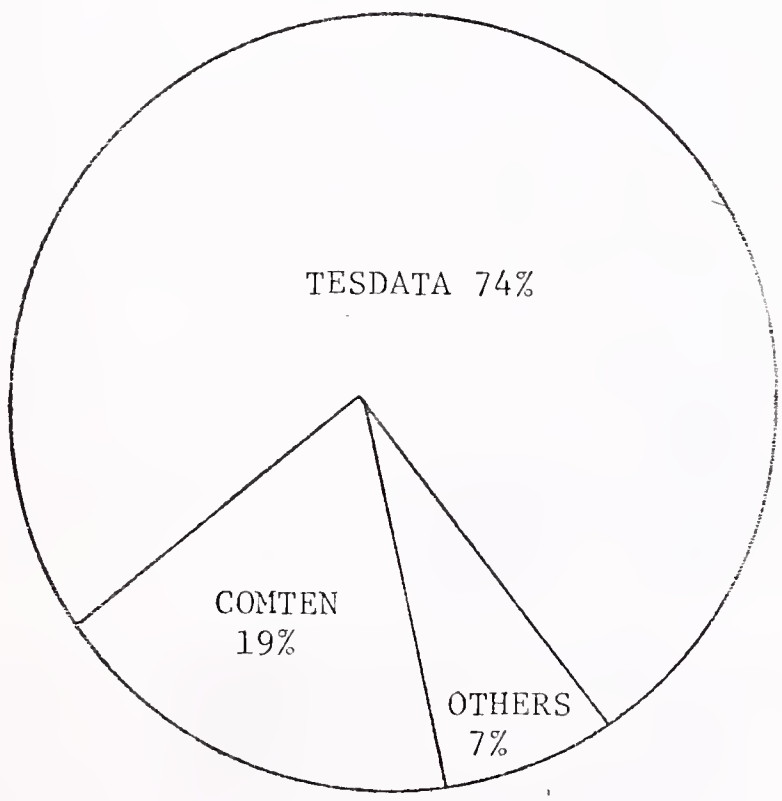
EXHIBIT VI-4

1976 CHPMS MARKET SHARE



1976 HARDWARE PERFORMANCE MONITORING

SHIPMENTS $14 MILLION

EXHIBIT VI-5

PROJECTED CHPMS SHIPMENTS IN UNITS AND DOLLARS

1976 - 1980

	1976		1977		1978		1979		1980	
TYPE OF INSTALLATION	UNITS	$000	UNITS	$000	UNITS	$000	UNITS	$000	UNITS	$000
NEW SHIPMENTS	137	11	168	14	173	19.2	168	22.5	175	25.1
INSTALLATION EXPANSIONS	25	2	36	3	36	4	37	5	49	7
REPLACEMENTS	13	1	24	2	27	3	30	4	42	6
TOTAL DOMESTIC SHIPMENTS	175	14	228	19	236	26.2	235	31.5	266	38.1

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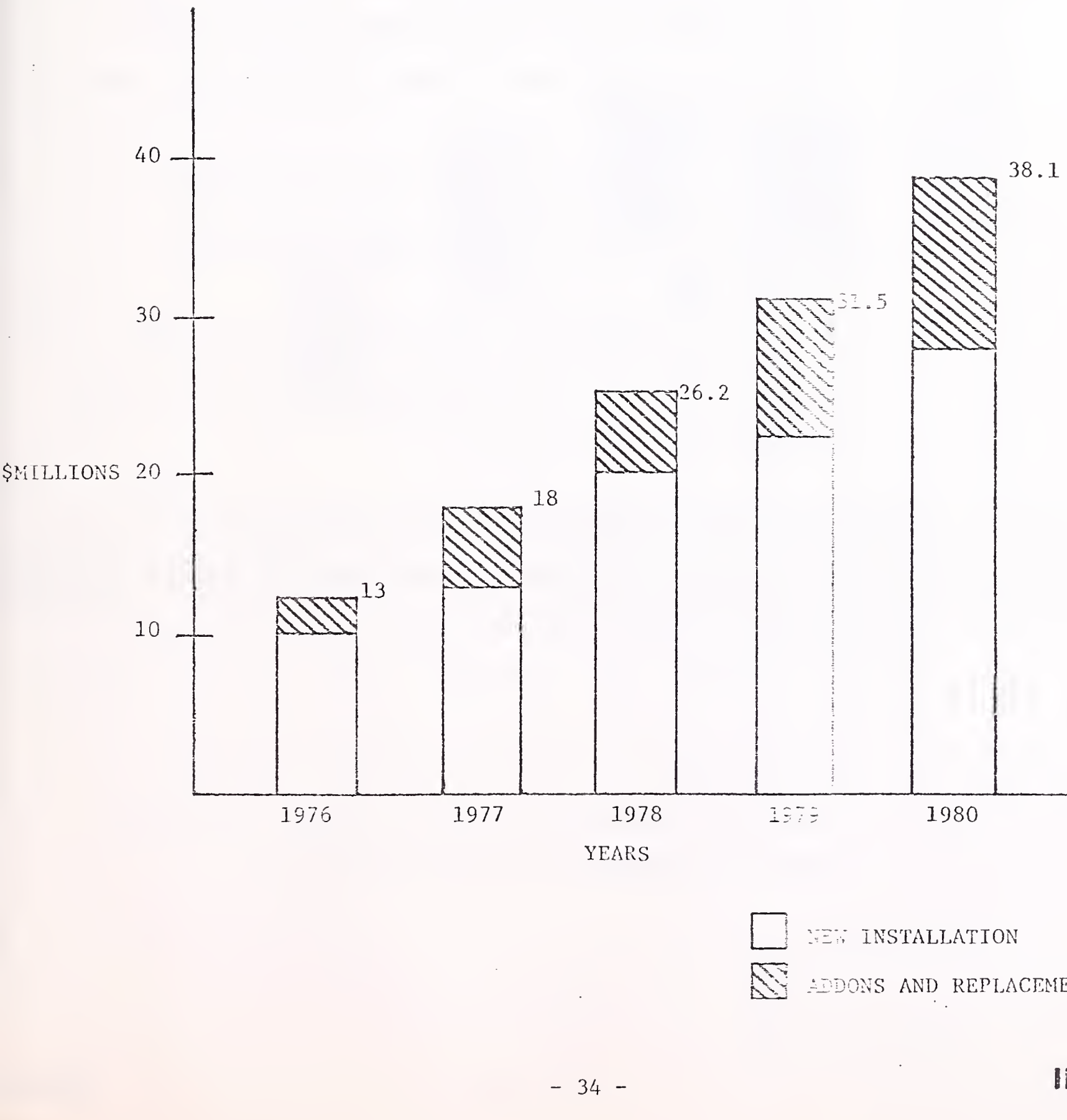
EXHIBIT VI-6

PROJECTED U.S. CHPMS SHIPMENTS IN

DOLLARS 1976-1980



installations and the degree of penetration into those installations. These projections are shown in Exhibit VI-5.

- Installations were segmented by single mainframe installations and multiple mainframe installations.

- The assumptions made were:

  - The value of CHPMS in the average single mainframe installation will increase from $50,000 to $70,000. The value of CHPMS in an average multiple mainframe installation will increase from $80,000 to $150,000 during the forecast period.
  - The market penetration in large single mainframe installations (SMI) will grow from 15% to 25% between 1976 and 1980.
  - The market penetration of CHPMS in large multiple mainframe installations will grow from 46% to 70% between 1976 and 1980. See Exhibit VI-2.

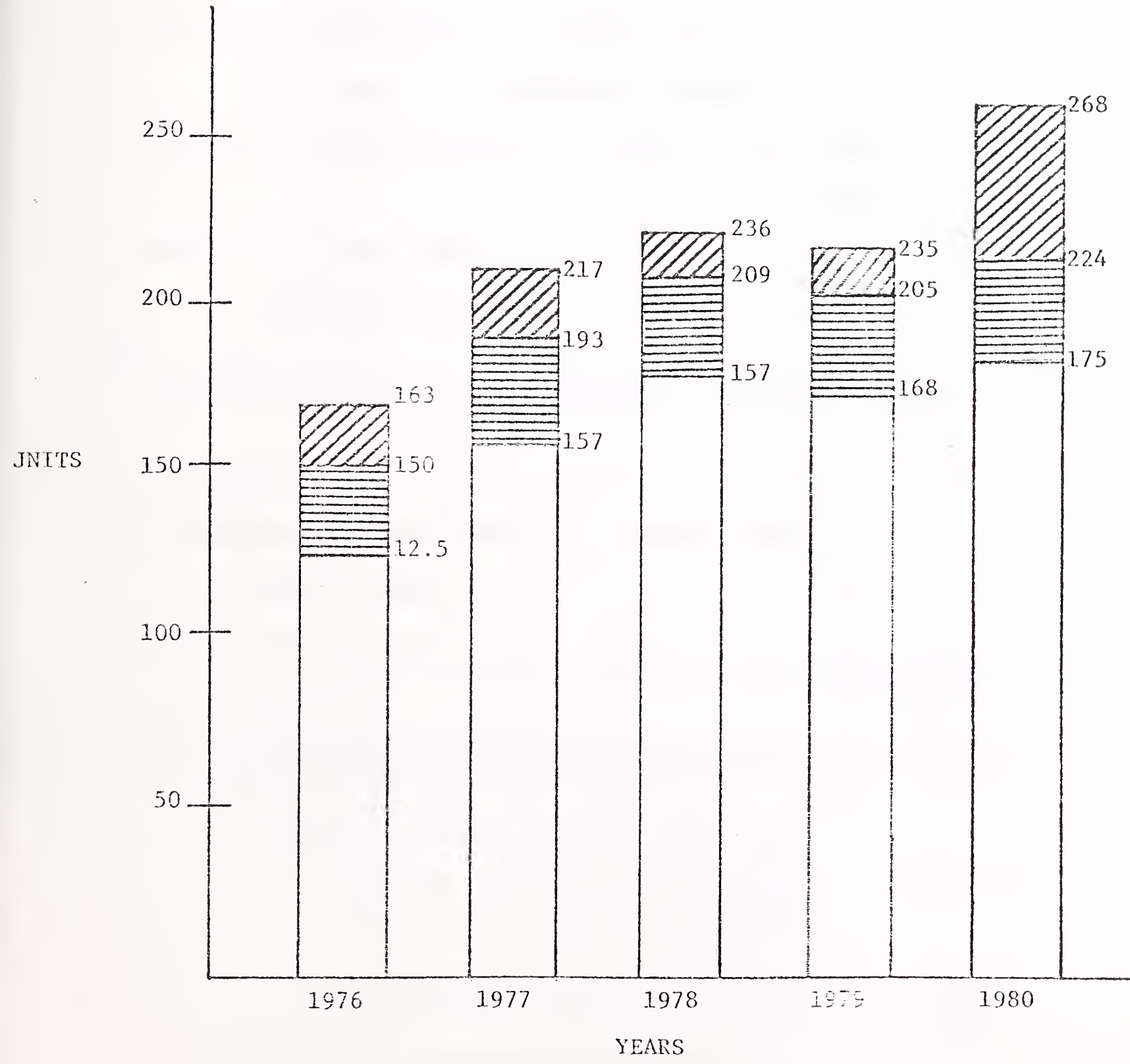
- The dollar value of hardware performance systems will grow faster than the units shipped during the forecast period. This will occur because the value of the systems shipped will grow from $80,000 in 1976 to $143,000 in 1980. See Exhibit VI-5 and VI-

  - This assumes user requirements and doesn't take into account the development of low cost hardware monitoring systems directed to the smaller installations.

EXHIBIT VI-6

PROJECTED U.S. CHPMS SHIPMENTS

IN UNITS 1976-1980



D. COMPUTER SOFTWARE PERFORMANCE MEASUREMENT SYSTEM (CSPMS) MARKET

- The market for Computer Software Performance Measurement System (CSPMS) is more mature than the market for CHPMS, having been established by COMRESS in the early 1960's.

  - IBM provides most CSPMS as an integral part of its operating system at no extra cost to the user.
  - IBM's CSPMS is considered inadequate by knowledgeable users.
  - Despite the dominance of the CSPMS market by Boole and Babbage, the market is still quite fragmented.

- The CSPMS market is estimated at $12 to $15 million in 1976 growing to $25 to $30 million in 1980.

- Over 50% of the respondents using performance measurement systems have commercial (non-IBM) software for which they paid a license fee. All used one or more of three types of software available from IBM.

  - Software which is part of an operating system:
    - OLTEP (on-line test executive program)
    - RMS (recovery management support)
  - Field developed software:
    - CICS entry system statistics
    - CICS/VS performance analyses

- Programs available through share such as:
  - SLACMON (Stanford Linear Accelerator Monitor)

- Performance management software is available from IBM either through SHARE or as part of the operating system.
  - Although 25% to 30% of the users seem to be satisfied with the IBM provided software, a larger number have purchased the non-IBM packages.
  - IBM also provides a performance measurement service which is considered a sales tool to increase IBM's hardware revenues.

- Most computer installations don't have the resources to write their own PM software. SLAC and Kellog are exceptions.

- Software PM can segment multiprogram jobs and determine CPU utilization of each job. It can also find out what the supervisor is doing (overhead).
  - Software is used for limited specific measurements.

- The knowledgeable respondent users with both hardware and software performance measurement systems reported that to obtain an accurate record of measurements both hardware and software must be used. Sample comments were:
  - "Hardware is best to determine accurately the actual utilization of each subsystem."

- "Software can best determine the efficiency of software."

E. COMPUTER PERFORMANCE MEASUREMENT SYSTEM SERVICE (CPMSS)

- The CPMSS market has not yet evolved and there is an opportunity to provide services in that market including:
  - Training
  - Evaluation of CPMSS and CHPMS results.
- INPUT forecasts that the CPMSS market will grow from 0 to $5 million between 1977 and 1981.
- The growth of this market is dependent on the speed with which the vendors in the industry recognize the opportunity to educate and sell potential customers on the benefits of performance measurement.

VII. TECHNICAL REQUIREMENTS FOR VENDORS

VII TECHNICAL REQUIREMENTS FOR VENDORS

A. SPECIALIZED KNOWLEDGE REQUIRED

- The hardware vendor should have specialized technical knowledge to be able to guide the prospect in his selection of the optimal combination of hardware and software to meet his objective.

- The vendors's personnel must understand the operation of the computer hardware whose performance is being measured in sufficient detail to be able to suggest the elements to be measured as well as the number of probes required, and the placement of the probes.

- The vendors's personnel should be able to train the user's personnel who will be responsible for the operation of the system.

  - A system performance audit capability should be developed. Measurements should be made before and after adjustments are made and an accurate record of savings/tradeoffs kept.

- Supervised measurements should be made three to four times a year by vendor personnel. These visits should be used to:
  - . Insure customer satisfaction
  - . Validate the PM monitors performance
  - . Determine additional PM requirements
  - . Recommend additional PM hardware to customer if appropriate
  - . Recommend new products or product modifications to product planning resulting from new customer requirements.

- Vendor's personnel should be trained to help the prospect determine the potential throughput increase, or cost savings which can be produced by a hardware monitoring system.
  - This increase should be quantified and assigned a monetary value to provide the prospect with a decision tool to help his management.

B. PLANNING FOR FUTURE SYSTEMS

- The increasing impact of data communications on the user's information processing cost structure requires that the vendor understand the economic relationship between data processing and data communication. The vendor should provide the prospect with performance measurement tools capable of measuring line

activity, front-end off loading, comparisons of daily traffic peak loads with historical data to obtain trend information, response times and line busy signals.

- Only very knowledgeable users, (20%) of those interviewed, believe that PM can be used as a tool to increase DB management performance.

- Therefore, most users need information and training to be able to recognize which elements in their DB systems can be optimized to increase throughput.

  - The objective is to reduce "seek" times and disk arm movement.
  - Reduce data access time.

VIII. MARKETING AND SALES REQUIREMENTS

VIII MARKETING AND SALES REQUIREMENTS

A. ACTIVE MARKET DEVELOPMENT PROGRAM

- Based on the interview sample, the motivating force for obtaining a PM system is most often either an internal problem (eg: "Production bottlenecks") or an external stimulus (eg: "I attended a conference on PM and this guy...")

  - If the response is to an internal stimulus generated by senior management, the tendency most often is to apply a patch to solve the immediate problem (eg: "Let's optimize our new operating system--it is causing all the problems." The result is a partial solution.
  - If the response is to an external stimulus such as, the operations VP attended a seminar, the pitfalls and false hopes generated can be very severe. Junior management is often given the task of implementing a PM program without the authority to spend any money.

- The hardware salesman called into either situation is at a disadvantage because he is dealing with an uninformed user with unrealistic expectations. This type of situation takes time and sales effort.

- It may be more profitable to generate the stimulus which will motivate senior management to actively start a PM program with clearly stated objectives designed to support the overall corporate objectives. (eg: the priorities in a bank will be different from those of a manufacturing firm or of a computer service vendor.)

- By stimulating thinking in this area and providing some tools, rules of thumb, procedures, etc., the sales person becomes an active, creative force who can shape the user's thinking rather than a hardware peddler who comes in after the users's mind has already been made up.

- To be able to do this, the sales person needs some specialized training, knowledge and sales tools.

B. MANAGEMENT ORIENTATION

- 72% of the interviewees indicated that the key proponent of performance measurement in their company was the Data Processing Manager, or an officer of the company. Therefore, the sales person should:

- Be able to quickly determine and understand the prospect's key requirements (i.e., increasing throughput, deferrment of equipment, reducing costs) and show how his product can satisfy those requirements.
- Be able to calculate the potential cost savings produced by the system.
- Understand what the hardware can and can't measure.
- Know case histories of satisfied users.
- Have installation references available citing specific savings.

C. THE SALES PERSON IS ALSO A CONSULTANT

The sales person should be able to act as a performance measurement consultant and advise the potential client on subjects such as:

- The appropriate budget level performance measurement.
- The type of personnel required for the PM function.
- The most appropriate reports to satisfy senior level management requirements.
- The reports most useful for equipment forecasting.
- Development of a one-day PM seminar directed to senior management.
- Developing a PM budget and a forecast of savings segmented by
  - Deferred hardware
  - other.

- The sales person should be able to recommend a format for long term equipment planning to include data base, data communication lines, data security, interdepartmental billing, performance auditing and system optimization.

- The sales person should strive to become recognized as a consultant rather than a sales person.
  - One way this can be accomplished is to prepare a talk for senior management relating the experiences of other users with performance management systems. Emphasis should be placed on money saving examples.
  - The same speech can be modified and published as an article.
  - The same subject can be dealt with from various viewpoints selecting the most appropriate industry and installation size.

D. USING PROSPECTS' "HIDDEN" MOTIVATIONS

- Something that emerged in personal interviews and which appears to be a strong emotional motivator for procuring PM systems is the "control" motivation. This key concept appeared in a variety of forms and guises. The obvious business oriented motivations are:

  - Control of expenses

- Control of software overhead
- Control of hardware performance

To the more subtle issues such as:

- "I'd like to know how fast my operators respond"
- "I'd like to know how efficient the satellite processing operations are"
- "I don't like to have IBM telling me when they think I should upgrade my system"

Providing the user with a tool that increases his control over his own shop is a very strong motivating force. Marketing should emphasize this aspect in order to appeal to the buyer, the motivator and the influence maker all along the decision making line. See Exhibit VIII-1.

PM reports should be tailored to satisfy the requirements of each level of management and the "control points should be emphasized (see Exhibit VIII-1).

Another hidden motive of many respondent DP managers, is "empire building" - justifying to senior management the requirement for more equipment, more people, more resources.

- When dealing with this type of situation, the most effective motivating force is providing through statistics, how despite an increase in efficiency, the increasing workload is producing a requirement for additional capacity.

EXHIBIT VIII-1

CUSTOMER MOTIVATION CHART

MANAGEMENT LEVEL	KEY MOTIVATIONS
SENIOR MANAGEMENT - President - Executive Vice President - Vice President Operations - Vice President Operations - Vice President Administration	• Increase profits • Decrease expenses • Save cash • Improve operations • Improve operations • Maintain control over operations • Ability to forecast requirements
DATA PROCESSING MANAGEMENT - EDP Director - DP	• Provide data in decision oriented form • Recommend actions to optimize operations • Decrease expenses • Save cash • Provide divisions with DP service • Control costs to stay within budge
TECHNICAL MANAGEMENT	• Avoid bottlenecks • Avoid reruns • Avoid unscheduled overtime • Stay within budget • Get new applications running on time • Control resources • Avoid problems and find out rapidly what is causing them

- The ability to distinguish effect of increased workload, from the effect of an increase in operational efficiency would be a desirable feature.

IX. COMPETITIVE ENVIRONMENT

IX COMPETITIVE ENVIRONMENT

A. COMTEN HARDWARE

- COMTEN is the only significant hardware competitor mentioned by the interviewed users. Out of 46 users interviewed, 8 had a COMTEN system.

- COMTEN had total revenues of $27.0 million in 1976 up from $18.8 million in 1975. COMTEN's net income doubled between FY 1975 and FY 1976 going from $1.1 million to $2.2 million.

- The company's research and development budget increased from $2.8 million to $3.6 million between 1975 and 1976 and the total number of employees grew from 655 to 851 during the same time period.

- COMTEN is in three major business areas segmented as follows:

Areas of business	1976 Share of total revenues
. Data Communications Hardware	70
. Performance Measurement Hardware	10
. Performance Measurement Software	13
. Total	100

B. COMTEN DATA COMMUNICATION PRODUCTS

- The principal data communications products are:

MODEL	PRODUCT DESCRIPTION	MAXIMUM LINE CAPACITY
3650	Small Scale Communication Processor	128
3670	Medium Scale Communication Processor	384
3690	Large Scale Communication Processor	512

- In addition, the company provides data switching system (DSS) and COMTEN emulation of the communication networking system (CNS) and network control program (NCP) of IBM. The DSS software provides the following monitoring functions:

  - Monitoring network resource status
  - Maintenance of diagnostic records

- Users interviewed indicated that they liked these features performed by the COMTEN hardware:

  - Network statistics are accumulated and summarized, and can be displayed on the system console at predefined time-out intervals or upon operator demand.
  - DSS has facilities for problem detection, isolation, analysis, and correction. Diagnostic aids are available for subchannel, program, line, and terminal traces. Recovery aids include logical error exits and physical error exits within DSS software. Various other services are provided by utilities such as the file access utility and standard end-of-day utility.

- Another feature related to performance is the network security feature on the 36xx product line.

  - DSS security facilities are available for protection against unauthorized access to the network, including:
    - Passwords for access to desired destinations
    - Logical access groups for predefining sets of destinations that a terminal or application may access
    - Console authority levels for limiting the level of control that may be exercised from network consoles
    - Transaction code validation for predefining sets of transaction codes that may be accepted in messages from network resources.

C. COMTEN'S PERFORMANCE MONITORING HARDWARE

- COMTEN's performance measurement hardware consists of a family of devices with the generic name of Dynaprobe; it is used to analyze the activity of computer hardware systems. The hardware costs range from $6,500 for a basic 8016 unit to $17,000 for a 7916 monitor.

- Dynaprobe-7900 is a top-of-the-line model in the COMTEN 7000 series of Computer Performance Monitors. Basic building blocks of the system are the D-7916 Monitor/Tape Buffer and the D-8025/6/7 Magnetic Tape Units. The Magnetic Tape Units come with several options: 7-level or 9-level IBM-compatible format ar recording densities of 800, and 1600 bpi. Dynaprobe-7900 is supported

by the Dynapar Software System and the COMTEN-developed System Measurement Guides.

- Dynaprobe-7900 may be configured to produce a powerful lineup of systems measurement equipment. Up to four D-7916 Monitors may be multiplexed to send concurrent readings to a single Tape Unit. Such a configuration would feature 128 Mini-Probes, 64 High Speed Counters, 48 Variable-Speed Counters, and 2400 hubs of combinatorial logic.

- Probes 32 Probe circuit capacity. Single or Quad (four probes in one case) Mini-Probes. Sense pulses from $\pm$0.25 to $\pm$60 volts, with a continuously variable threshold. 10-nanosecond sensitivity. 40-MHz repetition rate. Extremely high impedance: 3.6 megohms resistance; 5 picofarads capacitance.

- The D-8016 system is COMTEN's newest line of computer performance monitors. D-8016 forms an economical entry monitor, permitting the user to gain the benefits of system performance measurement at the lowest possible cost. D-8016 is also a growing configuration of performance monitoring equipment expandable to a capacity of 160 probes, 128 high speed counters, and 96 sampling counters. Beginning small, but growing big, D-8016 is second to none in the mini-monitor field.

- System orientation. Minimum configuration includes 16 high speed counters, 12 sampling counters, and 20 probes capacity. Through the D-8016 Buss, this may be expanded to 128 high speed counters, 96 sampling counters and 160 probes capacity.

INPU

- Basic Monitor. Interface to host system. Eight probes and sixteen counters are standard. Buss interface. Bar Graph Displays daisy-chained to this unit. Counts displayed via LED. Limit is 10 per D-8016 system. Eight Monitors may be active simultaneously, remaining two may act as display controllers.

- Bar Graph Display. Displays counter values in histogram format. Display indicators signal Basic Monitor control switch settings.

- Probe Capacity. Twenty probes per Basic Monitor. Full system-160 probes.

- Dynaprobe-8000 has, as its central component, a 16-bit mini-computer, the D-8011 Data Handler. Coupled with the D-8043 Data Controller (a complete Probe and logic interface for the monitored system), D-8000 offers a total systems measurement tool.

- D-8000 features include system input of 48 high-performance Mini-Probes; a 600-hub, removable Logic Plugboard in the D-8048; standard Real Time Clock; D-8011 Extraction Software for mapping events or time, and tracing monitored functions; ASR-33 Teletype interface to the D-8011 for easy set-up and modification of measurement selections.

- The Dynaprobe-8028 Data Handler is the newest entry in the Dyna-Probe line of performance Measurement System components. It was designed to fill the recognized need for high-performance data capture and distribution capability at a reasonable cost. An

extremely versatile and flexible Performance Measurement tool, its compatible design allows it to be combined with any other component or system in the Dynaprobe line, to form Performance Measurement Systems that are unparalleled in capability and cost/performance effectiveness.

- Dynaprobe systems utilize Dynapar software to provide reports of hardware performance. Dynapar software systems are the Data Reduction Complement of Dynaprobe Computer Performance Monitoring equipment. Dynapar systems convert and format performance data- probed by the Monitor and stored on tape - into several types of output report suitable for visual analysis. These reports include statistical displays, graphic (histogram) displays, and System Utilization Profiles. Some of the reports were designed to be sufficiently general for management review; others are suitably detailed for close examination of system activity by performance analysts.

- Basic Dynapar permits the user to display, in report format, the readings obtained by the Dynaprobe Counters, Statistical output, graphic output, and System Utilization Reports are generated from measurement data representing system functions either with respect to number (count mode) or duration (timing mode).

- Derivation sub-system. This sub-system permits the analyst to extend his investigation into system functions not measured directly. The analyst employs FORTRAN-like statements in the Dynapar input

INPU

to create derived values from directly measured values with the use of various arithmetic and logical operations. The Derivation Sub-system adds "logical" or "Derived" Counters and Constant Counters to the Counter capabilities of Dynaprobe Monitoring equipment.

- Mapping Sub-system. This sub-system may be employed when the analysis calls for a statistical distribution ("map") of program of file activity. With the Dynaprobe Monitor attached to the host computer's Instruction Address Register, for example, the execution of the program is sampled. Dynapar subsequently produces a Memory Activity Profile from the Dynaprobe tape.

D. COMTEN'S PERFORMANCE MEASUREMENT SOFTWARE

- Performance measurement software is sold and developed by COMTEN's Software Products Division located in Rockville, MD. This group was formerly called Comress, Inc. and was merged into COMTEN in 1974. There are three products sold by the Software Products Division:

  - ALERT
  - SCERT
  - AMIGOS

- SCERT is one of the oldest performance measurement systems and ALERT is the system which is currently marketed.

- ALERT is a performance analyzer and disc management system for S/360 and S/370. The analyzer pinpoints specific bottlenecks in Operations,

Systems, and Programming at the required level of solution whether it be...System, Program, Data Set, Job, or Job Step.

- ALERT monitors a system and produces over 50 reports in narrative form each of which explains the specific inefficiency, problem, delay or degradation activity encountered and, where applicable, presents a recommended solution. The user of ALERT has complete control over the detailed information reported. He has the ability to select which of the 50 reports he wants printed at any point in time - Report Selection, specific data reported which exceeds his established thresholds - Threshold Selection, and the amount of data to be printed which exceeds these thresholds - Volume Selection.
- ALERT's goal is to maximize system throughput and minimize hardware requirements. Achievement of this goal is realized through implementation of the corrective action recommendations contained in the narrative reports.
- The form and content of the ALERT Report: 8 1/2 by 11 inch size, table of contents, narratives, and glossary of terms, provides information to track improvements, provides a basic frame of reference for communication, and is designed for use by the entire organization. In addition to the performance narratives, the disc management system provides five reports specifically related to direct access usage.
- The user of ALERT has the capability to control his direct access investment at the volume and data set level. These

reports provide profile, capacity, trend and audit trail information in support of direct access problems addressed by the narrative reporting capability. These reports pinpoint capacity utilized by device class and volume, allocation by volume and data set, and potential contention by volume and data set. This information provides the basis for on-line or off-line assignment of volume and data sets temporary and non-temporary assignment of volume, determining charging rates for direct access usage, and charging specific jobs for direct access usage.

- ALERT processes standard SMF generated data in conjunction with data generated from OS and VS internal interfaces. The system requires 3-4K of resident core within the system control program. The post processing functions require a region or partition size of 120K.
- ALERT runs on IBM 360/50 & Up, 370/145 & Up, OS/MFT, MVT, VS1, VS2-ASSEMBLER

- SCERT is one of the oldest performance systems. SCERT 76 is a data processing management tool that enables decision makers to plan and "pre-test" hardware, software and application design alternatives... before implementation. It provides cost/performance projections of how any workload will perform in any hardware/software environment. SCERT runs on IBM 360/370, Min. 150K Bytes, Tape or Disk - ANS COBOL, ASSEMBLER, FORTRAN. The SCERT 76 system consists of 113 separate programs organized into six sub-systems which interface through two simulation libraries. These sub-systems are:

- SCRIBE (Input Control Utility). All input data to the SCERT 76 system is organized initially on the Pre-Simulation Library.
- SCAMP (Automatic Modeling) - The SCAMP sub-system offers the SCERT 76 user special facility in the initial modeling of an existing system.
- SCIMS (Data Base Analyzer and Modeler) - SCIMS provides the user with an IMS data base design analysis capability
- SCORE (Scheduling and Real time Simulator) - SCORE provides two separate simulation capabilities. The first is a discrete workload scheduling simulator that protrays the progress of any workload from the input queue through execution to completion. Additionally, SCORE provides an alternative technique for portraying the performance of random real time environments.
- SCALE (Discrete Mix Simulator) - SCALE provides the ability for a highly detailed and in-depth analysis of a fixed environment of any number of programs executing concurrently.
- SCOUT (Report Selection for Formatting) - All information generated in the course of SCERT 76 simulations and analyses is collected on the Post-Simulation Library in two separate files. One contains pre-formatted reports ready for printing and the other contains unformatted simulation results available to the user for further manipulation and to be used in creating reports of his own design for his particular needs. SCOUT provides the means of maintaining the Post-Simulation Library, selecting standard reports, and creating unique reports.

INPUT

AMIGOS, a disk accessing method that is software plug-to-plug compatible with IBM's ISAM (Indexed Sequential Access Method). It is a system for the management of indexed-sequential data that makes highly efficient use of computer resources.

- The AMIGOS transparency feature which is available for OS or VS systems, allows programs written for ISAM to process AMIGOS data sets without any change or recompilation of the application program. Only minor changes to the JCL need be made. This feature does not affect the operation of ISAM on data sets which have not been converted to AMIGOS.
- Included with AMIGOS are utilities to dump, load, and print AMIGOS data sets. In addition, its native command language is available for use with all programming languages. AMIGOS reduces the elapsed processing time and improves user response time through a more refined index structure and through efficient record overflow handling.
- AMIGOS allows combined random and sequential processing, and data set reorganization is accomplished automatically during processing. Disk space requirements are reduced by blocking overflow records and eliminating external keys. Benchmark trials are encouraged. Installation, training and maintenance are available on request.
- AMIGOS funs on IBM 360/30 and Up, 370, DOS, DOS/VS, OS, VS1, VS2, MVS - ASSEMBLER.

INPUT

COMPANY HIGHLIGHT

BOOLE & BABBAGE, INC.
510 Oakmead Parkway
Sunnyvale, CA 94086
(408) 735-9550

Bruce T. Coleman, President
Private Corporation

Total Company and Computer Services Sales
as of FY ending 9/77: $6,000,000 E*

NUMBER OF EMPLOYEES engaged in computer services: 105

KEY PRODUCTS: Boole & Babbage is involved in development sales of computer measurement, accounting and operation software products. Key products used for performance measurement and tuning of computer systems are:

- PPE, Problem Program Evaluator: for program evaluation. PPE samples programs to report activity of certain segments of program code. Inefficiencies commonly identified include excessive I/O time, poor iterative procedures, and residency of supervisory modules. It can be used with 360 and 370 equipment under DOS, OS and OS/VS.

- CUE, Configuration Utilization Evaluator: for evaluation of peripheral usage in specified configurations. It operates on IBM 360 and 370 equipment under OS or OS/VS.

- SMS/CAS, System Measurement Software/Computer Accounting System: for billing and accounting. It is intended to make programmers aware of costs and help provide long-range system performance measures. It operates on IBM 360 and 370 equipment under OS, OS/VS and TSO.

APPLICATIONS: None. Products are strictly systems oriented.

INDUSTRY MARKETS: B&B serves all industries. Products are equally usable by all industries.

GEOGRAPHIC MARKETS: Over 90% of the customers are distributed throughout the U.S., with slight concentration in the Northeast and Pacific states. Sales offices are located in the following cities:

COMPANY HIGHLIGHT/BOOLE & BABBAGE, INC.

Atlanta, GA	Lanham, MD
Chicago, IL	Los Angeles, CA
Dallas, TX	San Francisco, CA
Englewood Cliffs, NJ	Southfield, MI
Arlington, VA	St. Louis, MO
Cambridge, Ontario, Canada	Rosemont, IL
Montreal, Canada	Devon, PA
El Segundo, CA	Houston, TX

*E- sales estimated by INPUT.

COMPUTER HARDWARE AND SOFTWARE: Boole & Babbage uses RJE and terminals to a service bureau 158.

OVERALL ASSESSMENT AND TRENDS: Boole and Babbage was founded by Ken Kolence and David Katch in 1967. They are now members of the board. Venture capitalist Franklin "Pitch" Johnson, was approached about investing in B&B. After analyzing both the industry and the company carefully the group invested $30,000 initially. Much has been invested since that time, and Johnson is now the Chairman of the Board. In 1970 Johnson determined that what the company needed was more marketing emphasis and better financial control, and so Bruce Coleman was hired to implement these objectives as President. Within a year Coleman, Harvard Business School Graduate and ex-IBMer, turned the company around. Sales should double by 1981.

In addition to Pitch Johnson and Bruce Coleman, top management includes R.C. Coolidge, Executive Vice President of Marketing, and E.H. Goss, Secretary. Also, Tom O'Rourke, President of Tymshare, Inc., and Carl Reynolds of Hughes Aircraft, have recently become members of the board.

APPENDIX A

NAME	NP	INDUSTRY	NONE	GEOGRAPHY PC	M	MW	NC	SE	NE	H	S	B	COMTEN	TESDATA
Bell Helicopter		Disc Mfg.				X						X	Dyna Probe	
First National Bank		Banking		X			X							
Cornell University		Education	X						X					
Union Carbide		Process Mfg.										X		MS 58 86
Chemical Bank		Banking							X			X	Dyna Probe	
Dept. of Labor		F. Govt.						X			X			
Southern Permanente	X	Medical		X								X		MS 32
Consolidated Edison		Utility							X		X			
Irving Trust	X	Banking							X			X		MS 88
Raytheon Co.		Disc Mfg.	X						X					
Kentucky Bureau of Comp. Svc.		Govt. S & L	X			X						X		MS
Southland	X	Retail				X						X		MS
AMP, Inc.	X	Disc Mfg.							X			X		MS 32
First & Merchants Corp.	X	Banking						X				X		MS
Crown Zellerbach	X	Proc. Mfg.		X								X		MS
Pacific Telephone & Telegraph	X	Utility		X								X		MS
Charity Hospital		Medical	X					X						
Mississippi Chemical Co.		Proc. Mfg.	X											
General Mills		Disc Mfg.				X						X	Dyna Probe	
Celanese		Proc. Mfg.						X				X	7900	
National CSS		Services							X		X			
Optimum Systems		Services		X								X		Sumbox
N.C. Education Comp. Svcs.		Services						X			X			
Time, Inc.		Publishing				X					X			
Equifax		Services						X			X			

NAME	NP	INDUSTRY	NONE	GEOGRAPHY PC	M	MW	NC	SE	NE	H	S	B	COMTEN	TESDATA
New York Life Ins. Co.		Insurance							X			X		MS 88
Procter & Gamble		Mfg.					X				X		5-8028	
Merrill Lynch Pierce Fenner		Services							X			X	1-7900 1-8016	
Travelers Insurance		Insurance							X			X		MS 88
Cocacola Co.		Food & Bev.						X					8016	
Seaboard Coast Lines		Transport.						X			X			
Kellog Co.			X				X							
Midwest Stock Exchange*	X	Fin. Svc.					X					X		MS 32
Security Pac. Nat'l Bank		Banking		X								X	Dyna Probe	
Motorola		Mfg. Discrete			X						X			
Marathon Pipeline Co.		Transport.					X				X			
American Express Co.		Services							X			X	XX	
Union Oil Company		Proc. Mfg.		X							X			
Northrop		Mfg.		X							X			
Continental Airlines		Transport.		X							X			
Stanford (SLAC)		Govt. Res.		X								X		
Bank of America		Banking		X								X		MS (3)
Ryder Truck Rental		Transport.						X			X			
FAA	X	Govt.					X					X		MS 58 Mod 3
Allstate Insurance	X	Insurance					X					X		MS 88 58
Ashland Oil	X	Petroleum					X					X		MS 88/3

* Unhappy customer
** DSPI hardware Canadian Microsum

INPUT

APPENDIX B

Part A

MS SERIES SYSTEM

USER (HARDWARE OR SOFTWARE) QUESTIONNAIRE

1. a) What mainframe(s) (370/158, or equivalent, and larger) and operating system do you have presently installed?

   b) What new large mainframes (370/158, or equivalent, and larger) and operating system do you plan to have over the next three years?

2. Do you use any kind of computer performance management system?

   ___ a) Yes (go to question 3)

   ___ b) No (go to Part B, question 1)

3. ___ a) Is it a hardware system?

   ___ b) Is it a software system?

   ___ c) Use both (a) and (b)?

4. Please describe the performance measurement system(s) you have.

(see next page)

4. (contd.)

	Product 1	Product 2	Product 3
a) Name of Product:			
b) Name of Supplier:			
c) Date acquired:			
d) Title of person responsible for acquisition:			
e) Reason for acquisition:			
f) How did you acquire it? Purchase ____ Lease ____ Other ____			
g) How often is it used?			

4. (contd.)

	Product 1	Product 2	Product 3
h) What is it used for?			
i) What specific reports/data are most useful?			
j) What features, if any, would you like to see added? changed? deleted?			
k) How much would you pay for added features ($ or %)?			
l) Do you have any other suggestions for its improvement?			

INPUT

4. (contd.)

	Product 1	Product 2	Product 3
m) Please indicate your satisfaction with this product on a scale: 5 = extremely satisfied, would purchase again without hesitation 0 = extremely dissatisfied, would not purchase again.			
n) Would you purchase this product if you had to make the decision now?			
o) If not, why not?			

5. For your software performance measurement system, how important to you is the fact that the host computer must be used to produce performance measurement reports?

6. For users of hardware and software performance measurement (p.m.) systems:

   a) What specific things are done with your software p.m. system that are not feasible using your hardware p.m. system?

   b) Similarly, what is done by hardware that you cannot do by software?

7. How would you rate in importance the following uses of your computer performance measurement system? (1 = unimportant, 5 = critical)

   ___a) Meeting operations schedules as planned.

   ___b) Meeting time-sharing response specifications.

   ___c) Controlling costs or decrease expenses.

   ___d) Budgeting or planning work load more accurately.

   ___e) Forecasting future needs.

   ___f) Other (describe).

8. How many people are involved in performance measurement?

   ___ a) full time.

   ___ b) part time (what percentage of time spent?)

9. How much will you spend on performance measurement?

   In 1977 _____ In 1980 _____

   (Give growth rates if 1980 figures unobtainable)

10. What is your total EDP budget for 1977 _____

for 1980 _____

or (if they won't answer) what proportion of your total EDP budget is the amount you spend on performance measurement?

in 1977 _____% in 1980 _____%

11. Please detail the proportion of your performance measurement budget due to

hardware _____%

software _____%

people _____%

other (detail)

_____ _____%

Total 100%

12. How will these proportions differ in 1980?

13. How do you expect your DP budget to change between 1977 and 1980?

	1977	1980
a) Hardware		
b) Software		
c) Data Base Management		
d) Data Communications		
e) Other		
f) Other	_____	_____
g) Total	100%	100%
h) Performance measurement systems as percentage of (a), hardware cost (both on a purchase price basis)	____%	____%

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14. What positive or negative impact do you expect the following developments will have on your use of existing computer performance measurement systems (hardware or software)?

	Hardware	Software
a) Data base developments: (1977 and 1980)		
b) Data communications developments: (1977 and 1980)		

15. In monitoring data base systems performance,

a) What are the important factors?

b) What kinds of problems are important (e.g. contention, poor space use)?

16. If you are using monitors (hardware or software) to produce cost savings, how are the cost savings calculated?

___ a) fully absorbed costs?

___ b) cash flow basis?

___ c) direct cost basis?

___ d) other?

17. a) Are the cost savings "one time" or repetitive?

b) Methods of accounting or control:

18. Please estimate annualized savings obtained from use of your performance measurement systems.

19. Please indicate on a scale of 1-5 (1 = unimportant, 5 = critical) the importance of utilizing the performance monitoring system in fine tuning the following functions:

	Rating 1-5 Scale
i) Hardware or configuration	
ii) System software	
iii) Application packages	
iv) Data file	
v) Data center	
vi) Other (describe)	

20. What is the highest level of management who sees the performance monitoring report?

21. Who in your company was the main force in developing or obtaining computer measurement systems? (Title)

22. Assuming IBM (or vendor of user's host computer system) announced a hardware performance measurement system equivalent in performance to the system you are presently using (or would consider using), what price advantage must the non-IBM system provide in order to be selected?

___ a) > 10%

___ b) 10-20%

___ c) 20-30%

___ d) 30-40%

___ e) 40-50%

___ f) < 50%

INP

MS SERIES SYSTEM

NON-USER (HARDWARE) QUESTIONNAIRE

1. Did anyone ever offer to sell you a ha dware monitoring system?

Firm	Model #	Year

a) Who? _____ b) When? _____

c) No one ever did ___ (If no one ever did, go to question 3.)

2. Why didn't you buy?

3. What do you believe to be the most important potential benefits of a hardware monitor?

4. What new development (either in hardware or in your installation) would cause you to become a user of a monitoring system?

5. a) What is the probability of your becoming a user of a hardware monitoring system in the next three years?

___ none ___% when?(year) _____

b) What reasons do you have for this probability?

6. If you obtain a monitoring system would you prefer to:

___a) Purchase ___b) Lease ___c) Rent

INPUT

7. If you became a user:

	Title
a) Who would evaluate proposal?	_____
b) Who would specify the requirements for the monitor?	_____
c) Who would be the final buying decision-maker?	_____
d) What would be the approval process?	_____

8. Assuming IBM (or vendor of user's host computer system) announced a computer measurement system equivalent in performance to the system you are presently using (or would consider using), what price advantage must the non-IBM system provide in order to be selected?

___ a) > 10%
___ b) 10-20%
___ c) 20-30%
___ d) 30-40%
___ e) 40-50%
___ f) < 50%

9. a) How much would you spend on performance measurement?

_____ 1977 _____ 1980
(or growth rate)

b) What proportion is this of your computer equipment cost?

10. How would you justify a hardware monitoring system?

11. What is the highest price you would pay for a hardware monitoring system?

INP

12. Which of the following cost justification methods would you use:

___ a) Fully absorbed cost including manpower

___ b) Cash flow basis ($/month)

___ c) Direct cost basis

___ d) Other

13. Please categorize from 1-5 (1 = unimportant, 5 = vital) the importance of the following in your decision to acquire or not acquire a monitoring system:

a) IBM offers it ____

b) Provides statistics for management ____

c) Helps to increase efficiency of hardware and software ____

d) Helps meeting operating schedules ____

e) Helps to control costs and decrease expenses ____

f) Helps forecast future hardware needs ____

g) Heard from others how good it is ____